BW Technologies Limited – Aquapuretraveller

www.aquapuretraveller.com

Device Information

The BW Technologies Limited Aquapuretraveller is a handheld sports type squeeze bottle. The bottle has a capacity of approximately 0.65 L (22 oz). The bottle contains a filter cartridge using an activated carbon block depth filter surrounded by a plastic "sleeve" containing iodine resin beads. The filter cartridge is connected to the bottom of the drink spout. The filter cartridge is 6.5 cm (L) x 4 cm (Dia). The outside of the filter cartridge is a 0.2 cm thick plastic "sleeve" which acts to provide coarse filtration and houses iodine resin beads in a 0.1 cm space between the plastic sleeve and the carbon block filter. The iodine resin beads are designed to provide disinfection through direct contact with microbial pathogens as well as releasing iodine into solution for additional disinfection. The interior of the filter cartridge contains a hollow-core, cylindrical activated carbon block depth filter with a 0.8 cm thick wall. The carbon block filter is rated a 2 µm pore size. Water flow is radial, flowing from outside through the plastic "sleeve", iodine resin beads, and finally through the carbon block filter into the hollow inside and out the drink spout. Directions for use require the user to fill the bottle with water, replace the cap and shake (shaking releases iodine into the water), wait 15 minutes then use.

Effectiveness Against Microbial Pathogens

No data was received showing the effectiveness of this product with respect to the U.S. Environmental Protection Agency (USEPA) Guide Standard Protocol for Testing Microbiological Water Purifiers (reference 1). Independent data received (reference 2) that did not use the USEPA protocol and general knowledge of carbon block filtration and iodine disinfection indicate the device is capable of consistently reducing Giardia cysts and Cryptosporidium oocysts to the required minimum log reductions stated in reference 1 (i.e., 3-log) when used as directed. Data also indicate the device is not expected to consistently reduce bacteria (6-log) and viruses (4-log) when used as directed. The iodine resin beads will provide some disinfection upon contact with a microorganism; however, the short contact time provided due to the radial flow of water through the iodine sleeve prevents the resin beads from being more effective. The resin beads are also designed to provide a constant release of iodine into solution to provide additional disinfection capability. However, this process is highly variable since it is dependent upon the intensity of shaking the bottle and the level of water in the bottle. Once the water level drops below the level of the filter cartridge, the water is no longer in contact with the resin beads which then cannot release additional iodine into solution. Determining the effectiveness of the iodine released into solution as a function of CT (iodine concentration times contact, or wait time) is difficult. Many variables must be considered

including the rate of iodine dissolution (which is a function of shaking intensity) and usage. A rough CT estimate was calculated based on iodine dissolution data provided with the independent data (reference 2) and user directions. By assuming a constant rate of iodine dissolution and the directed 15-minute wait time, a CT of 6 mg-min/L is estimated. Based on this assumption, it is not likely that this device would be able to consistently meet minimum log reductions in reference 1 under more severe water quality conditions such as increased turbidity and lower temperatures. Additional virus and bacteria reduction can be achieved through extending the wait time beyond 15 minutes and routinely shaking the bottle to ensure presence of an iodine residual in the water. However, compared to devices using only a carbon block filter, this device can provide superior treatment with respect to reducing viruses and bacteria. Based on independent data not using the USEPA protocol and general knowledge of carbon block filtration and iodine disinfection, the BW Technologies Aquapuretraveller is assigned one √ for the reduction of Giardia cysts and Cryptosporidium oocysts and an X for bacteria and virus reduction (for an explanation of the rating checks click here).

Table. Expected Performance Against Microbial Pathogens When Used as Directed.

Microbial Pathogen Type	Expected Disinfection Capability	Evaluation Rating	Primary Pathogen Reduction Mechanism
Bacteria	> 6-log	X	size exclusion and disinfection
Viruses	> 4-log	X	disinfection
Giardia cysts	> 3-log	√	size exclusion
Cryptosporidium oocysts	> 3-log	√	size exclusion

Production Rate and Capacity

Inherent to the production rate and capacity of filtration devices is the quality of the raw water source. Because it is a squeeze bottle, the actual production rate is dependent on the user. The production capacity of the device is stated to be up to 350 L. However, production capacity will vary widely with raw water quality (i.e., turbidity).

Cleaning, Replacement, and End of Life Indicator

This device cannot be backwashed to remove sediment from the filter. When the device becomes unusable due to decreased production rate, the clogged filter cartridge must be replaced.

The bottle can be hand washed. For practical purposes, the filter cartridges are not cleanable. The device contains no end of life indicator short of filter clogging.

Weight and Size

Dry weight	130 grams
Size (height x diameter)	22 cm x 7 cm

Cost

The Aquapuretraveller is not sold at stores in the United States. The device is available through online ordering and at stores outside of the United States.

Aquapuretraveller bottle with filter	$50.00
Replacement filter	$45.00

Device Evaluation

No data was received that challenged the Aquapuretraveller against reference 1. Independent data received that did not follow the reference 1 protocol and general research on carbon block filtration and iodine disinfection indicate this device should be capable of consistently reducing *Giardia* cysts and *Cryptosporidium* oocysts when used as directed. This device is not likely capable of consistently reducing bacteria and viruses when used as directed. Increasing the wait time beyond the directed 15 minutes and routinely shaking the bottle to ensure presence of an iodine residual that will help reduce bacteria and viruses prior to filtering. The activated carbon should remove tastes and odors in addition to iodine. This device, like all filters with small pore sizes, is highly affected by turbid (cloudy) waters. Since the device is not able to be backwashed to remove accumulated particulates, once clogged, the filter must be replaced. There is no indicator of process failure or end of device useful life. Although this device uses iodine, when used as directed it is not expected to cause any adverse health effects for healthy adults with no pre-existing thyroid condition or sensitivity to iodine. This device is not recommended for use by pregnant women (concern for fetus), people with known hypersensitivity to iodine, people with a history (or family history) of thyroid disease, and people from areas with chronic iodine deficiency (reference 3).

Advantages

- Expected to consistently provide adequate protection from *Giardia* cysts and *Cryptosporidium* oocysts, although device-specific testing data using the USEPA protocol is not available.
- Simple and effective.
- Provides taste and odor reduction.
- No adverse health effects expected in healthy adults with no iodine sensitivity.

Disadvantages

- Not expected to be consistently effective against bacteria and viruses. Extending the wait time prior to drinking beyond 15 minutes will provide additional virus and bacteria reduction.
- Reduced production capacity when using high turbidity water.
- Not backwashable.
- No real-time indicator of process failure.
- Not recommended for use by pregnant women or people with iodine sensitivity.

References

1. USEPA, 1989. Guide Standard and Protocol for Testing Microbiological Water Purifiers. *Federal Register*. 54:34067.

2. Independent laboratory data provided by BW Technologies, Ltd.

3. U.S. Army Center for Health Promotion and Preventive Medicine, 2005. *Technical Information Paper; Iodine in the Use of Individual Water Purification Devices,* Aberdeen Proving Ground, MD.